

### SOLID WASTE COLLECTION EFFICIENCY EVALUATION

### City of Rockville



September 2004



#### Via E-mail



To: Hal Cranor, City of Rockville

From: John Culbertson, R.W. Beck

Subject: Collection Evaluation Report

Date: September 9, 2004

This memorandum summarizes the information that has been developed for the City of Rockville as part of the solid waste collection system evaluation performed by R. W. Beck. This information has been delivered in four separate transmittals:

- 1) Final Results of Collection Alternatives Evaluation, summarizing the operational and cost impacts of potential system changes that could benefit the City;
- 2) Appendix A--Benchmarking Summary, which includes comparative data from both local and national solid waste collection programs;
- 3) Appendix B--Route Observation Summary, including a description of current business practices; and
- 4) Appendix C--Focus Group Summary, which compiles feedback obtained from collection crews about potential system improvements.

#### **FINAL RESULTS OF ALTERNATIVES EVALUATION**



#### Via E-mail



To: Hal Cranor, City of Rockville

From: John Culbertson, R.W. Beck

Walt Davenport, R.W. Beck

Subject: Final Results of Phase II Collection Alternatives Evaluation

Date: September 9, 2004

The purpose of this memorandum is to present the final results of the Phase II Collection System Alternatives Evaluation. This analysis and write-up integrates the City's comments on the August 27 draft memorandum.

The City requested that the following five alternative scenarios be evaluated:

- Scenario 1: Eliminate backdoor collection for refuse;
- Scenario 2: Convert to fully-automated refuse collection on a twice per week service schedule;
- Scenario 3: Convert to fully-automated refuse collection on a once per week service schedule;
- Scenario 4: Convert to semi-automated refuse collection on a once per week service schedule; and
- Scenario 5: Eliminate the chipper route and use rearloaders to collect all yard waste.

Table 1 summarizes the projected annual cost savings of each of the five scenarios.

Table 1 Cost Savings by Scenario

Scenario	Annual Direct Cost Savings
Scenario 1: Eliminate Backdoor	\$119,843
Scenario 2: 2x/week Fully-automated	\$2,679
Scenario 3: 1x/week Fully-automated	\$209,849
Scenario 4: 1x/week Semi-automated	\$278,165
Scenario 5: Eliminate Chipper Truck	\$92,686

The remainder of this memorandum summarizes the data and assumptions used to analyze the impact of implementing each of these alternative scenarios, as well as more detailed results of the analysis. Note that all of the analysis included in this memorandum represents a "fully-implemented" alternative scenario for the purposes of comparing the current system. It is likely

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that full implementation of any scenario would need to be phased in over a period of years, and the full financial impact would not be achieved until full implementation was complete.

Note also that the costs shown in this memorandum represent a snapshot of current year costs. To the extent these costs are used to plan for future system changes, it would be necessary to escalate the costs based on appropriate escalation factors. For labor and most operating-related costs, an escalation factor related to cost of living increases (three to four percent) would be appropriate. However, for certain capital costs, it is recommended that a significantly higher escalation factor be used. Specifically, the cost of raw material (steel) needed to manufacture collection trucks has increased greatly in the past year. Information provided by the City's vendors, and supported by anecdotal information obtained by R. W. Beck, suggest that the capital cost of new collection vehicles may be expected to increase a minimum of 15 to 20 percent in the coming year, with increases of up to 30 percent in the near future being possible. The City should factor in these expected cost increases when planning any future system changes.

#### Overview of Scenario Analyses and Cost Assumptions

Our analysis of each scenario is intended to summarize the key assumptions used and to present the likely impact on the City's operations and direct costs were the scenario to be fully implemented.

Each alternative scenario is summarized via a series of tables containing key assumptions and/or results. Our analyses are based on both operating and cost parameters that we have measured for the City's current system, as well as our internal database of operating and cost parameters for the alternative scenarios selected by the City. Operationally, each analysis relies on the following parameters and data elements:

- Customer counts: For each different type of collection, there is a discrete number of customers receiving the service. Rockville services roughly 13,600 total households.
- Material quantities collected: Historical data is available on the amount of material to be collected by each collection system. These estimates were provided by Rockville based on weight tickets from the County transfer station..
- Set-out rate: The set-out rate represents the fraction of the total number of houses on the day's route that have set out material to be collected
- Actual hours worked per day: Although crews are compensated for four 10-hour days (40 hours) per week, the task pay system provides incentive for crews to work harder to finish the day's route earlier than a full 10-hour day. We have measured the actual time crews require to complete their collection task, which is typically less than a full 10-hour day.
- Productive seconds per stop: Different collection technologies have been shown to achieve different productivity levels. Our field observations provided insight into the current productivity in terms of the number of seconds needed to collect one set-out and drive to the

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next set-out. We possess similar data from other cities that have implemented these alternative collection systems.

Our analysis of each scenario also relies on cost assumptions for the current and alternative system. For current costs, we have attempted to apply actual data provided by the City. For the projected costs, we have relied on our internal database of capital and operating costs for systems comparable to those being analyzed as alternative scenarios in Rockville. Specifically, we have based our cost analysis on the following unit costs:

- Vehicle capital costs: Projected cost of acquiring a new vehicle of the specified type. Table 2 below summarizes the capital cost assumptions used in our analysis for all vehicle types. For simplicity, we have annualized the capital cost of each vehicle type based on straight-line depreciation (with no salvage value) over the expected useful life of the vehicle. Note that we have used a 10-year useful life for most vehicles, and a 7-year useful life for automated trucks. These assumptions reflect industry standard useful life projections. Rockville has reported that vehicles are currently targeted to have a 15 year useful life, which is far beyond the normal vehicle age, even for systems with low annual operating hours. For the purposes of modeling alternative scenarios, we have defaulted to the industry standard useful life; any attempts to maintain vehicles beyond the stated useful life could significantly increase annual maintenance and repair costs over those shown in this analysis.
- Vehicle maintenance and repair costs: Includes the costs of parts, labor, and outsourcing needed to maintain the vehicles. Table 2 summarizes the annual maintenance and repair costs, assuming vehicles are operated for their industry standard useful life. As stated above, attempts to maintain vehicles beyond these lifespans may result in significant increases in maintenance and repair costs over and above those projected.
- Vehicle fuel costs: Represents the expected annual fuel cost of each vehicle type. This information was provided by the City for the current system, while projected changes to fuel costs are based on the different operating characteristics of the different vehicle types modeled in the alternative scenario analysis.
- Cart capital costs: Projected cost of acquiring new carts for City residents. The cost of carts is also shown in Table 2 below.
- Crew labor costs: Represents the annual salary of an average crew person. Table 3 summarizes the crew cost assumptions based on City of Rockville data.
- Benefits rate: Specified as a percentage over and above the base salary that goes towards health insurance, FICA, retirement, and other City-provided benefits. The benefits rate is shown in Table 3.

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Table 2 Equipment Cost Assumptions<sup>1</sup>

Equipment	Purchase Price	Useful Life (years) [3]	Annualized Capital Cost [4]	Annual Fuel Cost	Annual O&M Cost
Rear Loader	\$145,000 [1]	10	\$20,351	\$2,200 [1]	\$7,000 [1]
Automated Side Loader	\$195,000 [2]	7	\$32,095	\$2,500 [2]	\$20,000 [2]
Chipper truck	\$94,000 [1]	10	\$12,174	\$2,200 [1]	\$6,000 [1]
Retrofitted tippers	\$8,000 for 2 [2]	5	\$1,760	NA	NA
Carts	\$40 [2]	10	<b>\$</b> 5	NA	\$1 [2]

<sup>[1]</sup> Based on current City data.

Table 3 Salary & Benefits Assumptions

Vehicle	Position	Hourly Rate	Annual Salary	Benefits (%)	Annual Salary plus Benefits
Rearload [1]	Operator I	\$15.27	\$31,771	30%	\$41,302
	Operator II	\$18.12	\$37,684	30%	\$48,990
Sideload Automated [2]	Operator II	\$18.12	\$37,684	30%	\$48,990

<sup>[1]</sup> Provided by City in response to data request.

The following sections describe the results of each alternative scenario analysis.

#### Scenario 1: Eliminate Backdoor Collection

In this scenario, City customers who currently receive backdoor collection will all be converted to curbside collection, except for those that are certified to receive a disabled or elderly exception. Current alley collection customers will continue to receive alley collection. Collection technology, service frequency, and other collection services will remain unchanged.

<sup>[2]</sup> Based on data from other private and municipal systems that utilize these items.

<sup>[3]</sup> Represents industry standard useful life

<sup>[4]</sup> For simplicity and consistency, annualized capital costs are based on financing the asset over the projected useful life at an interest rate of five percent.

<sup>[2]</sup> It is assumed that the Sideload driver would be comparable to a rearload Equipment Operator II. In some cities, automated vehicle operators are compensated at a slightly higher rate than a rearload driver.

<sup>&</sup>lt;sup>1</sup> We have used an estimate of 2.5 percent of residential customers that may qualify for backdoor collection based on being able to document a certifiable physical disability. This percentage is consistent with other cities that provide ADA accommodations. This represents 340 customers. Rockville reported that 23 customers currently receive backdoor recycling collection, which would only be provided to disabled customers. We believe the actual number will be between 23 and 340 customers, and have used the higher number to be conservative in our operational modeling.

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The City currently operates nine refuse routes per day, on Monday, Tuesday, Thursday, and Friday, with each day a paid 10 hours. This is a common daily route configuration. Two-person refuse collection crews in rearload vehicles provide curbside, backdoor, and alley service throughout the City, and collect approximately 13,760 tons of material on an annual basis. Table 4 compares the productivity of the current system with that projected were the City to eliminate backdoor service (with the exception of certified disabled residents).

Table 4 Scenario 1 Productivity Parameters

System Parameter		Current System	Scenario 1
Customers (households)	Curbside	7,187	11,979
	Backdoor	5,132	340 [1]
	Alley	1,287	1,287
Refuse set-out rate	First day	88%	85%
	Second day	73%	70%
Refuse productive seconds per stop		29	23
Actual hours worked per day	Mon-Tue	7 hours	7.5 hours
	Thu-Fri	5.5 hours	6 hours

[1] Estimated at 2.5 percent of total customer base. See footnote 1 on page 4 for more information.

Notable changes highlighted in Table 4 include: conversion of roughly 5,000 backdoor customers to curbside (all alley customers continue to receive alley collection); a decrease in set-out rates in the curbside system because collectors no longer have to go to the back of every backdoor customer to find out if a set-out has occurred; an increase in collection productivity by eliminating backdoor service; and a slight increase in actual hours worked (i.e., slight increase in the definition of a day's "task"). We make the latter assumption to suggest that, in return for no longer having to collect from backdoors for 40 percent of the City's households, collectors should be asked to slightly increase the number of households they serve each day (i.e., the daily "task" should include a slightly increased number of households). Specifically, our modeling assumes that each route will grow by roughly 95 households.

Based on the changed parameters in Table 4, Table 5 summarizes the impact on the daily routes needed to provide collection service.

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Table 5 Scenario 1 Projected Operational Results

System Parameter		Current System	Scenario 1	Change	
Refuse Routes per day		9	8	(1)	
Rearload Vehicles	Active	9	8	(1)	
	Spare	3	3	0	
Refuse Equipment Operators/ Collectors		18	16	(2)	

As shown in Table 5, the elimination of backdoor collection will reduce the required number of daily routes from 9 to 8. This will enable a reduction of one active rearload vehicle and two collection crew members<sup>2</sup>.

Table 6 summarizes the direct cost of the labor and equipment that will be eliminated in this scenario. Direct cost impacts are projected by multiplying the unit cost of a vehicle or employee by the number of impact vehicles or employees. Unit costs are taken from Tables 1 and 2.

Table 6 Projected Cost Savings of Scenario 1

Impacted Resources	Change in Resource Level	Line item	Direct Cost per Unit	Total Annual Cost (Savings) of Scenario 1
Refuse crew	(2)	Salary & benefits	\$45,146	(\$90,292)
-		Annualized Capital	\$20,351	(\$20,351)
Rearloaders	(1)	O&M Cost	\$7,000	(\$7,000)
		Fuel Cost	\$2,200	(\$2,200)
Total				(\$119,843)

As shown, the total direct savings of eliminating the backdoor collection service is estimated to be \$119,843. Although not shown, it is important to note that there is a strong likelihood that the rate and severity of worker injury will decrease. Although it is not possible to pinpoint the specific injuries that would have been eliminated by eliminating backdoor collection, a review of reported injuries in FY03 through FY04 suggest that \$47,300 in injury costs could have been avoided. Due to the lack of comparable benchmarks from other cities that have eliminated backdoor collection (most cities eliminated this service long ago and no data are available), it is

<sup>&</sup>lt;sup>2</sup> For the purpose of our direct cost analysis of solid waste collection operations, we assume that the costs of the crew and truck will "go away." It is recognized that these personnel may be re-assigned elsewhere in the City and that the associated labor costs will be shifted out of the solid waste collection function.

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not possible to further quantify the cost savings associated with reduced injuries and/or reduced health insurance premium payments. It is likely that additional financial benefits to the City will be attained.

#### Scenario 2: Implement Fully-automated 2x/week Collection

This scenario will convert all current curbside and backdoor customers to a cart-based curbside collection system serviced by side-loading, automated collection trucks. Alley customers will continue to be served by current collection methods. Service frequency will remain twice per week.

Table 7 compares the productivity of the current system with a 2x/week fully-automated system. Note that alley customers would continue to be served by a rearload semi-automated truck.

Scenario 2 System Parameter Current System Curbside 11,979 Customers (households) 7.187 Backdoor 5,132 340 [1] 1,287 1,287 Alley 88% 85% Refuse set-out rate First day Second day 73% 65% Refuse productive Seconds per stop Curbside 29 27 Alley 18 18 Bulky waste set-out rate (out-of-cart NA 3.0% set-outs) Bulk Waste productive seconds per NA 120 Actual hours worked per day 7 hours 8 hours First day 5.5 hours Second day 6.5 hours

Table 7 Scenario 2 Productivity Parameters

Note that Table 7 contains productivity parameters for bulk waste collection. Fully-automated collection requires residents to place all materials in a specially designed cart, usually 60 or 90 gallons. While this volume is sufficient to contain a week's worth of waste from most households, there are certain bulky items that do not fit in the cart and therefore cannot be collected by the fully-automated truck. Unless the City is willing to establish a fee system for out-of-cart set-outs, it is assumed in this scenario that an additional collection operation will be needed to handle the out-of-cart set-outs. Because the City has long experience with rearload vehicles, and because bulk waste (excepting white goods) is currently collected by the 2-person

<sup>[1]</sup> Estimated at 2.5 percent of total customer base. See footnote 1 on page 4 for more information.

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rearload refuse routes, we have modeled the bulk waste collection assuming a rearloader will be used.

Table 7 also highlights the following differences: slightly lower set-out rate due to the elimination of backdoor collection and also because cart-based systems tend to have slightly lower set-out rates; a reduction in the seconds per stop for refuse based on higher productivity of the automated system compared to the current system; and, an increase in the length of the work day premised on the automated truck doing most of the work as compared to the equipment operator in the current system.

Table 8 summarizes the impact on the daily routes needed to provide collection service.

Table 8 Scenario 2 Projected Operational Results

System Parameter		Current System	Alternative 2	Change
Refuse Routes per day	Rearload [1]	9	1	(8)
	Auto	0	7	7
Bulk Waste Routes per day	Rearload	0	1	1
Rearload Vehicles	Active	9	2	(7)
	Spare	3	1	(2)
Automated Sideload Vehicles	Active	0	7	7
	Spare	0	2	2
Carts		0	14,000	14,000
Equipment Operators/ Collectors	Rearload	18	4	(14)
	Auto	0	7	7

<sup>[1]</sup> Includes one alley route in both the current system and Scenario 2.

As shown, the City's collection system will change dramatically with the implementation of the fully-automated system. The rearload fleet will be reduced to one alley route and one bulk waste route per day, while seven daily fully-automated routes will be added. Fully-automated routes require only a single equipment operator, who will almost never have to exit the vehicle. Table 9 summarizes the cost impacts of the changes to the labor and equipment needed to operate this scenario.

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Table 9 Projected Cost Savings of Scenario 2

Impacted Resources	Change in Resource Level	Line item	Direct Cost per Unit	Total Annual Cost (Savings) of Scenario 2
Refuse crew	(14)	Salary & benefits	\$45,146	(\$632,044)
Automated Crew	7	Salary & benefits	\$48,990	\$342,930
Rearloaders		Annualized Capital	\$20,351	(\$183,156)
	(9)	O&M	\$7,000	(\$49,000)
		Fuel	\$2,200	(\$15,400)
Sideloaders		Annualized Capital	\$32,095	\$288,856
	9	O&M	\$20,000	\$140,000
		Fuel	\$2,500	\$17,500
Carts	14,000	Annualized capital	\$5	\$73,636
		Repair/ Replacement	\$1	\$14,000
Total				(\$2,679)

As shown, the total direct savings of converting to 2x/week fully-automated collection is insignificant at \$2,679. Labor cost savings of the one-person crew are offset by the increase in equipment purchase and O&M costs, as well as the cost of carts. Although not shown, it is important to note that there is a strong likelihood that the rate and severity of worker injury will decrease. Studies in other cities have shown that injury rates drop, as well as workers' compensation insurance premiums<sup>3</sup>. It is highly likely that additional cost savings will be realized by the City due to decreases in worker injury rates.

#### Scenario 3: Implement Fully-automated 1x/week Collection

This scenario will be the same as the previous scenario, except collection frequency will be reduced to once per week. Fully-automated collection systems typically offer only 1x/week

<sup>&</sup>lt;sup>3</sup> As cited in the SWANA MSW and Recyclables Collection Efficiency Workbook, Rochester, NY's worker's compensation costs dropped 52 percent after implementing a semi-automated system; Thornton, CO's injury costs dropped to zero the first year after implementation of an automated system after averaging over \$60,000 per year in the manual system, and workers' comp insurance premiums dropped more than 60 percent.

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collection, although there may be resistance in Rockville to going this direction. Ninety-gallon carts have been shown to be sufficient volume to contain a full week's worth of refuse for all but the largest households. In the few instances where a second cart is needed, it may be possible to pass on the cost of the second cart to the resident. However, it is assumed throughout our analysis that the cost of carts will be borne by the City and is included in the service rate.

Table 10 compares the productivity of the current system with that projected were the City change to fully-automated 1x/week collection (with the exception of certified disabled residents).

Table 10 Scenario 3 Productivity Parameters

System Parameter		Current System	Scenario 3
Customers (households)	Curbside	7,187	11,979
	Backdoor	5,132	340 [1]
	Alley	1,287	1,287
Refuse set-out rate	First day	88%	95%
	Second day	73%	NA
Refuse productive Seconds per stop	Curbside	29	27
	Alley	20	20
Bulky waste set-out rate (out-of-cart set-outs)		NA	3.0%
Bulk Waste productive seconds per stop		NA	120
Actual hours worked per day		7 hours	8 hours

<sup>[1]</sup> Estimated at 2.5 percent of total customer base. See footnote 1 on page 4 for more information.

Compared to Scenario 2, the projected set-out rates for this scenario are increased to reflect that residents receive only a single collection day. Based on these parameters, Table 11 summarizes the operational impacts of this scenario.

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Table11 Scenario 3 Projected Operational Results—Routes per Day

System Parameter		Current System	Scenario 3	Change
Refuse Routes per day	Rearload	9	1	(8)
	Auto	0	5	5
Bulk Waste Routes per day	Rearload	0	1	1
Rearload Vehicles	Active	9	2	(7)
	Spare	3	1	(2)
Automated Sideload Vehicles	Active	0	5	5
	Spare	0	2	2
Carts		0	14,000	14,000
Equipment Operators	Rearload	18	4	(14)
	Auto	0	5	5

Similar to the previous scenario, the City's collection system will change dramatically with a 1x/week fully-automated system. The rearload fleet will be largely replaced by a fully-automated fleet, carts will need to be acquired for all City residents, and labor needs will be reduced significantly. Table 12 summarizes the cost impacts of the changes to the labor and equipment needed to operate this scenario.

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Table 12 Projected Cost Savings of Scenario 3

Unit	Change		Amount	Total Annual Cost (Savings)
Rearload Crew	(14)	Salary & benefits	\$45,146	(\$632,044)
Sideload Crew	5	Salary & benefits	\$48,990	\$244,950
Rearloaders		Annualized Capital	\$20,351	(\$183,156)
	(9)	O&M	\$7,000	(\$49,000)
		Fuel	\$2,200	(\$15,400)
Sideloaders		Annualized Capital	\$32,095	\$224,666
	7	O&M	\$20,000	\$100,000
		Fuel	\$2,500	\$12,500
Carts	14,000	Annualized capital	\$5	\$76,636
		Repair/ Replacement	\$1	\$14,000
Total				(\$209,849)

As shown, the total direct savings of converting to a 1x/week fully-automated collection service is estimated to be \$209,849. Labor cost savings of the one-person crew fully automated vehicles are offset by the increase in equipment purchase and O&M costs, as well as the cost of carts. Although not shown, it is important to note that there is a strong likelihood that the rate and severity of worker injury will decrease. Although it is not possible to pinpoint the specific injuries that would have been eliminated by converting to a cart-based collection, a review of reported injuries in FY03 through FY04 suggest that \$22,700 in injury costs could have been avoided. Studies in other cities have shown that injury rates drop, as well as workers' compensation insurance premiums<sup>5</sup>. It is highly likely that additional cost savings will be realized by the City due to decreases in worker injury rates.

<sup>4</sup> Includes all bending and lifting-related injuries, needle sticks, and other cuts/abrasions from sharp material poking through a bag.

<sup>&</sup>lt;sup>5</sup> As cited in the SWANA MSW and Recyclables Collection Efficiency Workbook, Rochester, NY's worker's compensation costs dropped 52 percent after implementing a semi-automated system; Thornton, CO's injury costs dropped to zero the first year after implementation of an automated system after averaging over \$60,000 per year in the manual system, and workers' comp insurance premiums dropped more than 60 percent. As part of the local benchmarking survey conducted in this project, Ocean City, MD reported a 25 percent decrease in the number of

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#### Scenario 4: Implement Semi-automated 1x/week Collection

This scenario will evaluate the provision of carts to all customers for curbside semi-automated collection. The semi-automated scenario includes distribution of carts to all households, as well as retrofitting the City's existing refuse vehicles with cart tippers. Crews will continue to be 2-person for the semi-automated system.

Table 13 compares the productivity of the current system with that projected were the City to convert to a 1x/week semi-automated collection system for refuse.

System Parameter		Current System	Scenario 4
Customers (households)	Curbside	7,187	11,979
	Backdoor	5,132	340 [1]
	Alley	1,287	1,287
Refuse set-out rate	First day	88%	95%
	Second day	73%	NA
Refuse productive Seconds per stop		29	29
Actual hours worked per day	First day	7 hours	7.5 hours
	Second day	5.5 hours	6 hours

**Table 13 Scenario 4 Productivity Parameters** 

Because the semi-automated system relies on rearloaders retrofitted with tippers, there is no need to provide a separate bulk waste system, as bulk waste will continue to be collected on the rearload refuse routes in addition to waste contained in carts. Note that the productivity per stop with the semi-automated system is modeled to be equal to the current backdoor system. Although the seconds per stop will decrease for the fraction of customers who will be converted from backdoor to curbside service, this reduction is modeled to be completely offset by the increase in time it will take to service each and every curbside customer with the semi-automated carts. Specifically, collectors will need to retrieve the cart from the curb, tip the cart, and return the cart to the curb. This process is generally slower than manual collection.

Based on these parameters, Table 14 summarizes the impact on the daily routes needed to provide collection service.

injuries sustained and a 10 percent decrease in lost days attributable to injury after converting to a cart-based collection system.

<sup>[1]</sup> Estimated at 2.5 percent of total customer base. See footnote 1 on page 4 for more information.

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Table 14 Scenario 4 Projected Operational Results

System Parameter		Current System	Scenario 4	Change
Refuse Routes per day	Rearload	9	6	(3)
Rearload Vehicles	Active	9	6	(3)
	Spare	3	2	(1)
Carts		0	14,000	14,000
Refuse Equipment Operators/ Collectors		18	12	(6)

As shown in Table 14, switching to weekly semi-automated collection will eliminate 3 routes per day, which in turn reduces the number of trucks and crew needed to provide collection. This cost reduction is offset somewhat by the cost of carts and the cost of tippers. Table 15 summarizes the cost of the labor and equipment that will be eliminated in this scenario.

Table 15 Projected Cost Savings of Scenario 4

Unit	Change		Amount	Total Annual Cost (Savings)
Refuse crew	(6)	salary & benefits	\$45,146	(\$270,876)
Rearloaders		Annualized Capital	\$20,351	(\$81,403)
	(4)	O&M	\$7,000	(\$21,000)
		Fuel	\$2,200	(\$6,600)
Rearload cart tippers	8	Annualized capital	\$1,760	\$14,078
Carts	14,000	Annualized capital	5	\$73,636
		Repair/ Replacement	1	\$14,000
Total				(\$278,165)

As shown, the total direct savings of weekly semi-automated collection is estimated to be \$278,165. As with scenarios 2 and 3, it is likely that the rate and severity of worker injury will decrease, although not as much as the fully-automated system.

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#### Scenario 5: Eliminate Chipper Truck

This scenario considers elimination of the chipper truck on regular yard waste routes, and instead assumes all grass and brush collection will be performed by 2-person crew rearloaders (one during off-peak season, two during peak yard waste season). Mixed grass and brush will be delivered to the Montgomery County Compost Facility. It is assumed that the chipper truck cost will go to zero for solid waste collection (although in practice the chipper truck will be retained by the City for use in storm debris clean-up and other non-sanitation functions).

The City currently operates either one (off season) or two (peak season) rearload yard waste routes per day, plus one chipper truck. The rearloaders and chipper truck traverse identical routes, with the rearloader collecting bagged and contained yard waste, and the chipper truck collecting loose and bundled brush. These vehicles often leapfrog each other on the route. The rearloaders historically have tipped at the Montgomery County Compost Facility at a cost of \$29/ton, and the chipper truck has delivered wood chips for free to a local facility. The annual quantity delivered to the compost facility is roughly 1,800 tons, while the annual quantity of chipped brush is estimated to be 620 tons.

Montgomery County has confirmed that mixed loads of grass and brush are acceptable for delivery to the County's composting facility. This scenario evaluates the productivity and cost savings associated with eliminating the chipper truck and providing all yard waste collection service with the rearloaders. Table 16 compares the productivity of the current system with that projected were the City to eliminate the chipper truck.

System Parameter Scenario 5 Current System Customers (households) 13,606 13,606 Yard waste set-out rate Contained 18% NA Brush 8% NA Combined 22% NA Yard waste productive seconds per Contained 52 NA stop Brush 75 NA Combined NA 52 Actual hours worked per day

Table 16 Scenario 5 Productivity Parameters

As shown in the table above, converting to rearload collection increases collection productivity, although the rearloader will be collecting from more households than the current system. Based on these parameters, Table 17 summarizes the impact on the daily routes needed to provide collection service.

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Table 17 Scenario 5 Projected Operational Results

System Parameter		Current System	Scenario 5	Change
Yard Waste Routes per day	Rearload (peak season)	2	2	0
	Rearload (off season)	1	1	0
	Chipper Truck	1	0	(1)
Vehicles	Rearload	2	2	0
	Chipper	1	0	(1)
Yard Waste Equipment	Peak Season	6	4	(2)
Operators/ Collectors	Off Season	4	2	(2)
Yard Waste disposed at County Compost Facility (tons)		1,800	2,420	620

As shown in Table 17, the elimination of the chipper route will allow the City to save the cost of operating the chipper truck and crew, while still covering the existing service area. Table 18 summarizes the cost of the labor and equipment that will be eliminated in this scenario.

Table 18 Projected Cost Savings of Scenario 5

Unit	Change		Amount	Total Annual Cost (Savings)
Yard waste crew	(2)	Salary & benefits	\$45,146	(\$90,292)
		Annualized Capital	\$12,174	(\$12,174)
Chipper truck	(1)	O&M Cost	\$6,000	(\$6,000)
		Fuel Cost	\$2,200	(\$2,200)
Disposed Yard Waste	620 tons	Tip fee	\$29	\$17,980
Total				(\$92,686)

As shown, the total direct savings of eliminating the chipper truck is estimated to be \$92,686. This recommendation has already been implemented by the City.

#### CONCLUSION

We offer the following comments on the potential for cost savings that could be achieved by the City if any of these scenarios were to be implemented.

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Eliminating Backdoor Collection: Our analysis shows that the elimination of backdoor collection will provide direct cost savings to the City. In addition to the direct cost savings that would be achieved by reducing a route, it is likely that injury rates and lost work time would be reduced as well. Additionally, Rockville is one of only a handful of cities in the United States that continues to provide backdoor service at a single service fee charged to all residents. Most municipalities that provide backdoor collection—which is a premium service—also charge a premium rate. If the City continues to offer this service, it is recommended that the rate structure be evaluated and that differential rates for backdoor and curbside service be strongly considered. Based on time-and-motion studies conducted by R. W. Beck, the true rate for a backdoor customer would be expected to be 40 to 80 percent higher than the curbside rate.

Automated Collection: Given the lack of productivity of the current backdoor system, even the 2x/week automated system would appear to yield a cost savings. However, the level of cost savings is relatively minor given the extensive changes to the collection operation as well as customer behaviors. If the City opts to implement fully-automated, the clearest advantage would be achieved by going to a 1x/week frequency of service. It is of interest to note that a weekly semi-automated system provides comparable cost savings to the 1x/week fully-automated system.

We note that bulk waste collection in Rockville has been modeled to be provided as part of the basic service, with no additional fees. In many cities that have implemented automated collection, additional fees are charged for large set-outs. This reflects a "pay-as-you-throw" mentality, which charges more to customers who generate more bulky items, while keeping base rates lower for all customers who use just the regular weekly collection service. While specific fee structures vary widely, common approaches include charging by the number and type of bulk item (e.g., \$15 to \$50 per item), by the cubic yardage of all bulk items (e.g., \$5 per cubic yard), or by the fraction of a truckload with a minimum charge (e.g., \$50 per quarter truckload or a \$35 minimum for loads smaller than a quarter truckload)<sup>6</sup>. Given that Rockville has recently converted to a call-in system for handling bulky wastes and therefore can collect data about the number of pick-ups, it will be possible over time to track the total costs and quantities collected for the purpose of developing an equitable rate structure.

Eliminate Chipper Truck: Based on our productivity analysis, this change has already been implemented by the City.

It was beyond the scope of this study to assess the City's solid waste rates, and to determine if current rates are sufficient to cover direct and allocated indirect costs for providing solid waste collection and disposal. However, we nonetheless note that the implementation of any of these cost savings will only slow the rate of increase in solid waste collection costs, and therefore, it is unlikely that such cost savings will translate to lower rates.

<sup>&</sup>lt;sup>6</sup> Charges based on the fraction of a truckload are more common when bulk waste is collected via grapple truck. It is unlikely that Rockville would consider this type of fee structure given that a rearloader will be used for bulk item collection.

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#### Additional Comments about Fully- and Semi-Automated Collection

We wish to note these other intangible benefits of automated systems that are difficult or impossible to quantify. These include:

Beneficial to City workforce: Automated systems have been shown to reduce worker injury, absentee rates, and worker's compensation claims, and to increase employee morale. For municipal entities, where worker's compensation insurance is covered under one policy for all municipal employees, it can be difficult to estimate the net savings attributable to reduced on-the-job injury and insurance claims. To the extent such savings can be quantified, it should be considered in this analysis. However, studies have shown that automated collection improves safety and reduces injury rates.

Enables future service delivery improvements: If the City were to switch to an automated system now, it would open the door to future collection efficiency improvements, including:

- Implementation of automated yard waste collection by distributing another cart;
- Implementation of automated single stream recycling collection (subject to the availability of a processing facility that can accept single stream material); and
- Establishment of a fee schedule for oversize bulk waste set-outs that require special service. Such a system better aligns the rates residents pay for solid waste with the level of service they receive. Under this type of system, there would be a fixed rate for refuse service. The fixed rate could include refuse service, plus one collection of bulk waste set-out per quarter without increasing the rate. However, residences that generated more than one bulk waste collection per quarter would pay an additional fee for each successive set-out. In this way, residents who generate little or no bulk waste set-outs would only be charged the fixed monthly rate, while residents who generated more bulk waste would be charged accordingly.

Aesthetics and cleanliness: By providing standard carts for use by residents for refuse set-outs, automated collection systems are widely believed to provide better street and neighborhood aesthetics compared to collection systems where residents can set out waste in any format they desire. Additionally, carts are designed to prevent entry by vectors such as rodents, raccoons, and birds, and also prevent windblown litter by enclosing all waste with hinged lids (assuming the carts are of good quality).

Reduced personnel management and route supervision demands: Automated systems reduce the number of collection staff needed. The reduced personnel requirements reduce the demands placed on route supervisors and collection management.

Conversely, automated vehicles introduce higher maintenance, repair, and operating costs to the fleet maintenance division. Automated collection vehicles should only be procured with close coordination between the solid waste and vehicle maintenance division.

The items above are intended to highlight some of the intangible benefits (as well as challenges) that have been cited by other municipalities that have implemented such collection systems. Rockville departmental managers, City management, and elected officials ultimately need to

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weigh all of these factors in determining the best course of action for the City's residents, employees, and themselves.

### Appendix A BENCHMARKING SUMMARY



### Appendix A Benchmark Results

#### Overview

As part of the collection efficiency analysis for the City of Rockville (City), R. W. Beck conducted two benchmarking exercises related to the collection of municipal solid waste (MSW):

- Local Benchmarking of communities located in the vicinity of the Washington Metropolitan area, and
- National Benchmarking of national communities from R. W. Beck's databases.

Local benchmarking is helpful to city managers and elected officials because it provides information on communities that are well known and may be compared in the local media. National benchmarking is helpful to identify industry trends and best practices.

Conversely, there are definite limitations to benchmarking any solid waste system, due to the wide variation in how individual systems operate. Every collection system is unique in some way, so it is often not meaningful to compare individual elements of different systems. Rather, benchmarking comparisons are helpful to identify strategies that have proven successful elsewhere and may be applicable to the City of Rockville.

The results of each benchmarking exercise are outlined in this appendix.

#### Local Community Benchmarking

To conduct the local benchmarking, R. W. Beck and the City jointly prepared a benchmarking survey. The City targeted eight communities for the local benchmarking, with a range of collection systems. To conserve project budget, the local benchmarking survey was conducted by City staff, with results compiled and analyzed by R. W. Beck. The following communities were included in the benchmarking survey:

- College Park, MD
- Frederick County, MD
- City of Fairfax, VA
- Ocean City, MD
- Arlington County, VA
- Gaithersburg, MD
- Takoma Park, MD
- Fairfax County, VA



Responses (in some cases partial) were received from all eight communities. This appendix summarizes and compares the solid waste and recyclables collection system in each community, based on their responses to the benchmarking survey.

Table 1 provides a broad overview of the services provided in each of the eight communities and the City of Rockville.

Table 1
Collection System Comparison

		~	Gart	age		•	Yard	Bulky	
Community	HHs Served	Frequency	Provided by	Collection Type	Service Location	Recyclables Frequency	Waste Frequency	Waste Frequency	Residential Rates
Rockville	12,842	2x/week	Public	Manual	Curb & Backdoor	1x/week	1x/week	Call in	\$27.75/mo
College Park	4,500	1x/week	Public	Auto/Semi- Automated	Curb	1x/week	1x/week	1x/week	Funded by City Taxes; no rate available.
Frederick County	70,060	Varies in Unincorp areas; 2x/week in City of Frederick	Public & Private <sup>1</sup>	Varies in Unincorp areas; Manual in City of Frederick	Curb & Backdoor	1x/week	Drop-off only	1x/year	Open System
City of Fairfax	6,062	1x/week	Public	Manual	Curb & Backdoor	1x/week	1x/week	1x/week	Funded by City Taxes; no rate available. No extra fee for bulky waste.
Ocean City	2,320	1x/week	Public	Automated	Curb	1x/week	1x/year	Call in	Funded by City Taxes; no rate available. Extra fee for bulky waste billed separately.
Arlington County	32,045	1x/week	Private	Semi- Automated	Curb	1x/week	April	Bi-weekty	\$20.47/mo; no extra fee for bulky. Appliances & bulk metal: \$20 first item, \$10 ea add*! item.
Gaithersburg	11,500	n/a	Private	n/a	Curb	1x/week	1x/week	1x/month	Open System
Takoma Park	4,269	1x/week	Public	Manual	Curb	1x/week	1x/week	Call in	Funded by City Taxes; no rate available. Extra fee for bulky waste.
Fairfax County	43,000	1x/week	Public & Private	Semi- Automated	Curb	1x/week	1x/week (seasonal)	Call in	User Fees on Real Estate Tax Assessment. No extra fee fo bulky waste.

n/a = information was not available

<sup>&</sup>lt;sup>1</sup> The City of Frederick operates its own collection system. In other municipalities and in the unincorporated portions of Frederick County, collection is provided by private haulers.

Highlights of the survey that may be of particular interest to Rockville are shown below.

System variability: As reflected in the table above, every collection system is unique in some way. None of the communities contacted has a collection system that is directly comparable to Rockville's system. Even Fairfax City—which is the only other local community to offer backdoor—was reported to collect garbage only once per week, while Rockville currently collects twice per week. The combination of collection frequencies, collection technology used, and other system parameters vary widely, even between communities that at first glance appear to be similar to Rockville. Given this variation, it is important not to place too great an emphasis on comparisons between system parameters. Rather, the benefit in comparing is to identify the successful elements in other collection systems that may be applicable to Rockville as it considers improvements to its collection system.

System Funding Variability: Although in Rockville solid waste collection and disposal services are covered with a user fee, this is not the case in many of the local communities surveyed. Some communities cover the cost of collection as part of local tax millage, so rates are not readily available. Other communities have open collection, which requires residents to subscribe for service with one of multiple local haulers. It is not possible to obtain meaningful rate data from these communities. Even in communities that have a user fee or annual non-ad valorem assessment on the property tax bill, it is not certain that the rates shown accurately compare the true costs, simply because each community may have a different mix of underlying services covered by the rate. Additionally, disposal tip fee differences can impact the rates/costs.

Route Sizes: Table 2 summarizes the average route size for each City. Because of the differences between each city's collection system, it is difficult to compare the City of Rockville's route sizes with several of the other communities listed on an apples-toapples basis. For example, manual collection types (usually with rearload trucks) with multiple crew that can serve both sides of a street cannot be readily compared to fullyautomated collection systems with side-loading vehicles that serve one side of the street. Table 2 should therefore only be used as a general guideline, and not as a clearcut comparison of like collection systems. However, given that Rockville provides backdoor collection to a large proportion of its customers, it is of interest to note that the average route size in Rockville is competitive with other local systems that use more efficient collection practices (i.e., no backdoor). The only other local community with backdoor collection (Fairfax City) operates significantly smaller routes than Rockville (although this is likely due at least in part because Fairfax City performs only once per week collection, which means more waste is collected from each household on the route).

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Table 2
Comparison of Route Sizes (Households per route)

	G	arbage Collection	on	
City	Frequency	Collection Type	Avg. # of HH per Route	Task Pay (Y/N)
Rockville	2x/week	Manual	756	Y
City of Fairfax	1x/week	Manual	600	N
Ocean City	1x/week	Automated	230	N
Arlington County	1x/week	Semi- Automated	801	n/a
Fairfax County	1x/week	Semi- Automated	500	Y

Key: n/a = Collection system information was not available.

Back/Side Door Collection: Table 3 summarizes the communities that offer back/side door collection of MSW, how many households use the service, and any additional fee paid by the resident for this level of service.

Table 3
Back/Side Door Collection Comparison

Community	Total Number of Residential HHs	Number of Back/Side Door MSW Collections	Number of Back/Side Door as a % of Total	Variation in Fees for Back/Side Door MSW Collection vs. Curbside
Rockville	13,600	5,907	43%	No variation in fees.
College Park	4,500	37	< 1%	Back door pickup requires an application and a doctor's note.
Frederick County	70,060	24,887	36%	n/a (HHs subscribe w/private hauler)
City of Fairfax	6,062	4,500	74%	No user fees; service covered by taxes
Arlington County	32,045	240	< 1%	Application & certain restrictions apply.
Takoma Park	4,269	64	1%	Backdoor pick-up for certified handicap only

Table 4 shows a more detailed comparison of the materials collected in each of the local communities. As shown, Rockville provides the highest service of any of the local communities, accepting nearly everything a resident will set out on the curb.

Table 4
Comparison of Materials Accepted in Residential Program

	Rockville	College Park	Frederick County	City of Fairfax	Ocean City	Arlington County	Gaithers- burg	Takoma Park	Fairfax County
Curbside Garbage	Х	Х	Х	Х	Х	X	X	Х	Х
Backdoor Garbage	X			X					
Recycling	X	Х	X	Х	Х	X	X	X	Х
Yard Waste	X	Х	X	X	Х	X	X	Х	Х
Fumiture/mattresses	X	Х	X	Х	Х	X	X	Х	X
Appliances/White Goods	X	X	X	X	х	X	X	X	X
C&D Debris	X	Х		Х		X			
Wood	X	X		Х		X	X	X	Х
Boxes/Boxed wood	X	X		X	Х	X	X		
Bulky scrap metal	X	Х		X		X	X		X
Household Clean- outs/move-outs	X	X		X	Х	X	X		X
Set-out Limits (Y/N)	N	N	No, but there will be soon.	Y	N	N	Y	Y	Y
Additional Charge for some items (Y/N)	N	N	Not currently.	N	Υ	Y	N	Y	N

Although College Park also reported collecting the same range as Rockville, backdoor service is not regularly provided in College Park. Our route observations support the conclusion that Rockville provides a premium service to its residents.

The spreadsheet matrix containing results of the local benchmarking survey is attached to this document.

#### **National Collection System Alternatives**

R. W. Beck maintains operating metrics on a variety of cities and counties nationwide that provide services in highly varied ways. These data have been compiled from direct analysis of these systems and/or from other benchmarking efforts. We have compiled selected operational data from various programs across the country to illustrate the range of collection system alternatives available, and to highlight industry trends. Table 5 presents a selection of national communities and gives a broad overview of each collection system.

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Table 5
Collection System Comparison

			Gart	age				Bulky Waste	
Community	HHs Served	Frequency	Provided by	Collection Type	Service Location	Recyclables Frequency	Yard Waste Frequency	Frequency/ Collection Type	Residential Rates
Rockville, MD	13,600	2x/week	Public	Manual	Curb & Backdoor	1x/week	1x/week	Call in	\$27.75/mo
Phoenix, AZ	347,9821	1x/week	Public & Private1	Automated	Curb & Aliey	1x/week	Service not provided	Quartedy/semi- automated	\$20.70/mo
Minneapolis, MN	110,000²	1x/week	50% Public, 50% Private <sup>2</sup>	Semi- automated (City)	Curb & Ailey	Every Other Week	1x/week (April- Nov)	2 items allowed per week/manual collection	MSW w/ recycling: 22-gallon: \$17.25/mo 94-gallon: \$19.25/mo
Marietta, GA	23,895	2x/week	Public	Manual	Curb & Backdoor	1x/week	1x/week	Call in	Volume-based rates from \$18.50 to \$51.50
Decatur, GA	8,051	1x/week	Public	Manual	Curb & Backdoor	1x/week	1x/week	Call in	Annual fee of \$180/year, plus volume- based bags (\$.30, .50, & 1.00 per bag).
Charlotte, NC	140,000	1x/week	75% Public, 25% Private <sup>7</sup>	Automated	Curb	1x/week	1x/week	1x/week	\$8 to \$9.50 per households
Orlando, FL	48,000	2x/week	Public	Manual	Curb	1x/week	1x/week	1x/week	\$14.35/ma
Ocala, FL	13,400	2x/week	Public	Manual & Automated	Curb & Backdoor	Drop-off only	1x/ <del>wee</del> k	1x/week	\$18.70/month for curbside, \$26.05 for rear door service.
Oklahoma City, OK	160,000	1x/week	Public & Private <sup>3</sup>	Automated	Curb	1x/week	Service not provided4	1x/month with grapple trucks & rearloaders	
El Paso, TX	144,000	1x/week	Public	Automated & Semi- automated	Curb	Drop-off only	Service not provided	Call in	\$14.00/month
San Antonio, TX	310,000	2x/week	Public & Private <sup>5</sup>	Manual⁵	Curb & Alley	1x/week	Service not provided	2x/year	\$12.21/month
Tucson, AZ	141,500	1x/week	Public	Automated	Curb & Alley	1x/week	Service not provided	2x/year	\$14.00/month
City of Hartford, CT	35,000	1x/week	Public	Auto & Semi-auto	Curb	1x/week	1x/week (seasonal)	1x/week	n/a (millage)

The City of Phoenix has 6 collection districts that are bid at staggered intervals. The City bids competitively against the private haulers. Currently, the City services 3 of the 6 districts for a total of 185,885 households.

There are several notable highlights in or related to Table 5:

<sup>2</sup> Per City Ordinance, at least 50% of the MSW & recycling collection services must be provided by City of Minneapolis employees. Currently, 50% of the dwelling units (55,000) are serviced by City crews and 50% by Minneapolis Refuse, Inc., a consortium of private haulers contracted by the City.

<sup>&</sup>lt;sup>3</sup> City of Oklahoma crews service approximately 69,000 households and a contracted vendor services approximately 91,000 households.

<sup>&</sup>lt;sup>4</sup> The City of Oklahoma City does not collect yard waste separately. It is collected with the regular garbage.

<sup>&</sup>lt;sup>5</sup> Approximately 10% of the City of San Antonio's households are served by the private sector.

San Antonio is currently implementing a pilot to study fully-automated collection.
 Three of Chanotte's four collection quadrants are collected by the City solid waste division as a result of winning a managed competition. The fourth quadrant

is collected by a private hauler who won the bid.

Rates shown are for collection only. Fully loaded rate including disposal and other services is not available (City recoups full cost via millage).

Automation: Although manual collection is still common, the solid waste collection industry has been moving for over a decade towards more automated forms of collection. Many cities have implemented semi-automated or fully automated systems. It is of interest to note that the semi-automated and fully automated collection systems almost entirely provide only once per week service. This is because the special carts provided to residents in a cart-based system are large enough to contain a full week's worth of refuse from a family of four. Automated technologies handle the heavy lifting of the full week of refuse.

Bulk waste collection: Rockville is among the dwindling number of communities that offer unlimited call-in of bulk waste collection. Especially in communities that move towards automated collection, it has often been the case the bulk waste collection frequency is reduced to monthly, quarterly, or even less frequently. Additionally, studies conducted in Phoenix, Garland (TX) and elsewhere have shown that only 20 percent of the households in the typical system generate 80 percent of the bulky waste, and that including bulk waste collection as part of the standard rate is not equitable to most rate payers.

Managed Competition: Especially in larger cities, there has been great success in providing an incentive for city collection operations to improve the efficiency of their service delivery through managed competition process. In this process, the community procurement department solicits proposal from both the private sector as well as from the community's own operations division, and selects the low bidder. Managed competition has worked in Charlotte, Minneapolis, and Phoenix, where public collection divisions have competed successfully against the private sector. We believe Rockville is not large enough to consider a managed competition process, but we bring this up to demonstrate that, in our opinion, there is no reason a public collection operation cannot be competitive with a private sector company.

**Productivity**: Table 6 compares the average route size for selected communities performing manual curbside (no backdoor), semi-automated, and automated garbage collection. Although each community may operate under different parameter (e.g., some communities work five 8-hour days while others work four 10-hour days), it is of interest to note the productivity levels that are achievable under various collection systems. We believe Rockville is reasonably productive given the level of backdoor set-outs in the City.

Task Pay: Also shown in Table 6, we note that Task Pay systems generally have much higher productivity compared to systems where Task Pay is not offered. Task Pay denotes a system whereby collection crews are given a daily task (usually measured in public sector operations in terms of number of households to collect), and are paid for a full 8-hour or 10-hour day even if the task is completed early. Task pay, even in some manual systems (see Lakeland, FL), has been shown to greatly increase productivity if the task is adequately defined. This has been shown to provide incentive to work faster in both public and private systems. Chicago, New Haven,

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<sup>&</sup>lt;sup>1</sup> In private collection systems, the task is often supplemented with incentive pay for higher weight of collected material, and/or for covering additional routes when other crews are absent.

and Atlanta do not have task pay for garbage collection, and it is noteworthy that these communities have some of the lowest productivity levels shown.

Table 6
Comparison of Route Sizes (Households per route)

		Garbage Collect	ion	Average	
City	Frequency	Collection Type	Avg. # of HH per Route	Recycling Route Size	Task Pay (Y/N)
Rockville, MD	2x/week	Manual	756		Y
Phoenix, AZ	1x/week	Automated	1,200-1,500 (10-hr. day)	1,200-1,500	Y
Minneapolis, MN	1x/week	Semi-Auto	658	361	Y
Ocala, FL	2x/week	Manual & Automated	844	Drop-off only	Y
Gainesville, FL	1x/week	Automated	1,075	1,229	n/a
Gilbert, AZ	1x/week	Automated	1,000	1,750	n/a
Cary, NC	1x/week	Manual	546	816	n/a
El Paso, TX	1x/week	Automated & semi-automated	798	Drop-off only	n/a
San Antonio, TX	2x/week	Manual <sup>1</sup>	1,300	2,250	n/a
Tucson, AZ	1x/week	Automated	1,150	1,650	n/a
Hartford, CT	1x/week	Semi & Auto	700	900	N
New Haven, CT	1x/week	Manual	400	600	N
Chicago, IL	1x/week	Semi- automated	425	n/a	N
City of Atlanta	1x/week	Semi-Auto	570	1,500	N
City of Lakeland, FL	2x/week	Manual	1,300	1,300	Y

<sup>1</sup> San Antonio is currently implementing a pilot to study fully-automated collection.

Backdoor Collection: Over the past three decades, the solid waste collection industry has unequivocally moved away from backdoor collection as a standard operating practice. In our review of national benchmark communities that still provide backdoor as a standard service, we uncovered very few in addition to Rockville and Fairfax City. These communities—Cary, NC, Sioux Falls, SD, and Marietta, GA—are shown. It is of interest to note that a very low, subsidized rate is available from Cary (i.e., the majority of the cost to provide this service is not published and is included in the millage), and that Sioux Falls has a variable rate system, which has been shown to decrease the quantity of solid waste set out for collection. It is also of interest to note that to the extent other communities offer backdoor service as an option to residents (excluding disabled, where backdoor is typically offered at the regular rate), there is customarily a service rate that is 40 to 80 percent higher than the standard curbside collection rate. Ocala, FL, offers backdoor at a 40 percent premium to their standard rate—as a result, roughly 10 percent of the residents continue to pay for the higher rate, while the remaining 90 percent have converted to curbside.

Table 7
Back/Side Door Collection Rate Comparison

Communities that Offer Back/Side Door Collection	HHs Served	Variation in Fees for Back/Side Door MSW Collection	Notes
Rockville, MD	13,600	Single fee structure, \$27.75/month.	Curbside and backdoor residents pay the same amount.
City of Marietta, GA	23,895	Volume-based rates range from \$15.50 to \$51.50/mo. No difference in fee for curbside or backdoor.	Residents have the option of placing cans at curb or storing at rear of the HH.
City of Ocala, FL	13,400	\$18.70/month for curbside collection, \$26.05 for rear door service.	Residents have the option of paying a higher fee for rear door service.
City of Minneapolis, MN	110,000	Only offered to disabled/elderly.	Resident must meet w/ foreman and an application is required.
Town of Cary, NC	34,906	Single fee structure \$7.67/month <sup>1</sup> .	All MSW is collected from the backyard.
City of Sioux Falls, SD	49,731	Open hauling system: residents subscribe w/private haulers. Volume-based fees range from \$10.50/mo to \$17.25/mo.	Per City Ordinance, all containers (MSW, recyc, YW) must be kept at rear of premises, even on collection day.
City of Athens, GA	n/a	Franchise collection system. Haulers must offer variable rates.	Residents have the option of placing cans at curb or storing at rear of the HH.
City of Decatur, GA	8,051	Single fee structure, based on volume. No difference in fee for curbside or backdoor.	Beginning in January, 2005, all MSW will be collected from the curb.

The monthly collection fee does not cover the full costs of collection. Costs are subsidized by the General Fund.

In conclusion, it is difficult to draw any specific conclusions based on a benchmarking analysis. However, local characteristics and national trends can help guide Rockville in implementing changes to its collection system to meet the many challenges of providing quality service at a competitive cost. This is a balancing act in every community—hence the range of services and rates.

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Arma in square miles         Rectivilie         College Park         County         Fairtax           Residential Households         6,335         6,84,1         25         664,1         6 6 6           Curbacide         Curbacide         5,907         37         24,837         1,500           Residential Households         6,835         4,433         4,500         7,060         6,602           Total         Track customer calls related to SW/Recycling         1,880         X		County 664.1 195,277 70,060 X	Fairfax 6 5 21,000 1,562 4,500 6,062 X X X Manual 7,462 1 1 1 600	Ocean City 10 7,196 2,320 N/a 2,320 X X X Automated 33,500 1 1	County 26 26 189,937 31,805 240 32,045	Gaithersburg 10 50,000	Takoma Park 2.4 17,000	Fairfax County 395 1,015,600
13.03 5.2 664.1		864.1 195,277 45,173 24,887 70,060 X	21,000 1,562 4,500 6,062 6,062 X X X Manual 7,462 1 1 1 1 600	10 7.195 2.320 2.320 2.320 X X X Automated 33,500 1 10	26 189,937 31,805 240 32,045	50,000	2.4 17.000	395 1,015,600
S7,619   23714   195,277     6,835   4,463   45,173     12,842   4,500   70,060     12,842   4,500   70,060     1,650   X		195,277 45,173 24,887 70,060 X	21,000 1,562 4,500 6,062 K  X  Amanual 7,462 1 1 1 600	7,195 2,320 1/32 2,320 X X X Automated 33,500 1 1 10	189,937 31,805 240 32,045	50,000	17,000	1,015,600
12,842   4,463   45,173     5,907   37   24,487     12,842   4,500   70,060     1,650		45.173 24,887 70,060 X	1,562 4,500 6,062 X X Manual 7,462 1 1 1 600	2,320	31,805 240 32,045	002.77	_	
B		45,173 24,887 70,060 X	1,562 4,500 6,062 8,062 X X Manual 7,462 1 1 1 1 600	2,320	31,805 240 32,045			
or         5,907         37         24,887           omer calls related to SW/Recycling         T2,842         4,500         70,060           w many?         X<		74,887 70,060 X	4,500 6,062 X X X Public 7,462 1 1 1 600	Automated 33,500 10 10 10 10 10 10 10 10 10 10 10 10 1	240 32,045	11,500	4,205	43,000
noner calls related to SWIRecycling         1,850         70,060           w many?         1,850         X		70,060 X	6.062  X  X  X  Manual  7.462  1  1  1  600	2,320 X X X Automated 33,500 1 1 10	32,045		64	
omer calls related to SW/Recycling         X         X           w many?         1,650         X         X           hwants         Auto/Semi-         Auto/Semi-         Auto/Semi-           on Type         Manual and tons collected         13,285         1         Automated           nor y (per week)         13,285         1         C <td></td> <td>×</td> <td>X  Nanual  7,462  1  1  1  1  600</td> <td>Automated 33.500 1 1 10</td> <td></td> <td>11,500</td> <td>4,269</td> <td>43,000</td>		×	X  Nanual  7,462  1  1  1  1  600	Automated 33.500 1 1 10		11,500	4,269	43,000
Oilection         X         X           collection         Tybic         Auto/Semi-           Tryata         Public         Auto/Semi-           non Type         Manual         Auto/Semi-           non Type         13,285         1           noty (per week)         2         1           rate or participation rate         none         None           rate or participation rate         none         None           Immis         756         2         1           rate or participation rate         756         2         1           rate or for out sept day         756         2         1 auto/3 semi           rate or for out for route for members on each truck         3 for all routes, 1         1         1           rof crew with CDL         18         2         1         1           Public         Public         Public         Private         1           Private         A gat         A gat         A gat         A gat           rol folicited         A gat         A gat         A gat         B gat           rol folicited         A gat         A gat         B gat           rol folicited         A gat         B gat <th< td=""><td></td><td>×</td><td>Public Public Manual 7,462 1 1 1 1 600</td><td>Automated 33,500 1</td><td></td><td></td><td></td><td></td></th<>		×	Public Public Manual 7,462 1 1 1 1 600	Automated 33,500 1				
1,850   Public			Manual 7,462 1 1 1 1 1 600	Public Automated 33,500 1 1 1 10		×		
On Type         Public         Autor/Seminated           on Type         Manual         Autor/Seminated           lons collected         13,285         1           rox (per week)         13,285         1           rox (per week)         2         1           rox (per week)         100%         None           rox (per week)         756         2           rox (per week)         756         1 auto/3 seminated           rox (per week)         100%         1           limits or participation rate         100%         1           rox (crew members on each truck         3 for all routes         1           rox (crew with CDL         18         1           rox (crew with CDL         1         2           rox (crew with CDL         4.881         8.526           rox (crew with CDL         4.881         8.526			Public Manual 7,462 1 1 1 1 600	Automated 33,500 1	4,528		×	2,000
Public         Auto/Seminate           on Type         Manual         Auto/Seminated           on Type         13,285         1           nory (per week)         100%         1           rate or participation rate         100%         1           limits or participation rate         100%         2           limits or participation rate         756         2           rate or participation rate         756         1 auto/3 seminate           rof routes per day         756         1 auto/3 seminate           rof crew members on each truck         3 for all routes, a			Public  Manual  7.462  1  1  1  1  600	Automated 33,500 1				
on Type         Manual         Autor/Semi-           nor collected         13,285         1           nor collected         2         1           rade or participation rate         100%         100%           limits         none         None           r of routes per debt         756         2           r of routes per debt         756         2           r of crew members on each truck         3 for all routes, all collection         1           r of crew with CDL         18         1           r of lotal crew (FTEs)         18         Protein           r of lotal crew (FTEs)         18         8,526           nor Type         4,881         8,526           nor Type         4,881         8,526           nor Type         4,881         8,526           nor Type         1         73%           imal collected         2         1           nor Type         4,881         8,526           nor Type         1         73%           imal collected         2         9           nor Type         4         2         9           runber of households per route         845         2 Feb         9 <td></td> <td></td> <td>Manual 7,462 1 1 n/a 1 600</td> <td>Automated 33,500 1 1 1 1 10 10 10 10 10 10 10 10 10 10</td> <td>Private</td> <td>n/a</td> <td></td> <td>Pub/Pri</td>			Manual 7,462 1 1 n/a 1 600	Automated 33,500 1 1 1 1 10 10 10 10 10 10 10 10 10 10	Private	n/a		Pub/Pri
on Type         Manual         Automated           lons collected         13,285         1           nory (per week)         100%         1           rate or participation rate         100%         None           limits         9         2           r of routes per day         756         1 auto/3 semi           r of crew members on each truck         3 for all routes, all collection         1           r of crew members on each truck         3 for all routes, all collection         1           r of crew with CDL         18         Public           r of lotal crew (FTEs)         18         Ranual           r of lotal crew (FTEs)         18         73%           r of lotal crew (FTEs)         73%         1         1           r of lotal crew (FTEs)         4.881         8.526           r of lotal crew (FTEs)         73%         73%           r of lotal crew (FTEs)         73%         73%           r of lotal crew (FTEs)         4         2         9           r of routes per day         4         2         9           r of routes per day         6 for routes           r of crew membe	<del>                                      </del>		7,462 7,462 1 1 1 1 600	33,500 1 1 1 1/a 10	Semi-			-semi-
tons collected to receive the collected to receive whether the collected to receive with CDL to total crew (FTEs) to to			7,462 1 n/a 1 600	33,500 1 n/a 10	Automaled	n/a		Automated
Table of participation rate   100%			1 n/a 1 600	1 n/a 10	48,806	n/a	4,270	49,644
Infinits	<del>-</del>		n/a 1 600	n/a 10	Weekly	n/a	-	1
Imitis   None   None   None   Imitis			n/a 1 600	n/a 10		n/a		
r of routes per day         9         2           r of crew members on each truck         756         1 auto/3 semi           r of crew members on each truck         3 for all routes, all collection         1 mode of truck           r of crew with CDL         18         1           r of lotal crew (FTEs)         18         Private           r of lotal crew (FTEs)         18         Private           r of lotal crew (FTEs)         Manual         Manual         Manual           r or flotal crew (FTEs)         73%         73%         73%           r or flotal crew of principation rate         73%         73%         73%           r and or participation rate         73%         73%         73%           r of routies per day         4         2         9           r of crew mambers on each truck         2         4         2         9           r of crew mambers on each truck         2         2+eb         1			1 600	40		n/a		
156   1 auto/3 sem   756   1 auto/3 sem   1			900		8	n/a	-	16
1 auto/3 semi   2   1 auto/3 semi   1 auto/3		•		230	801	n/a		200
1 or route foremen	on 1		5	1	3	[ n/a	3	3
Tot route foremen all collection of total crew (FTEs)   18   18   19	-							
Tot route foremen   1/98s   1	-		,		,			,
18   Public				77		n/a		2)
18   Public   Private			-	20	6	n/a	3	-
Private         Public         Private           on Type         Manual         Manual         Manual           tons collected         4,881         8,526         1           ncy (per week)         2         1         1           rate or participation rate         73%         73%         73%           limits         none         n/a         73%           t of routes per day         4         2         9           amber of households per route         845         2         9           t of crew members on each truck         2         2-Feb         1			5	25	26	n/a	9	92
Public         Private           Manual         Manual           4,881         8,526           2         1         1           73%         73%         73%           none         4         2         9           4         2         9           845         9,035           ck         3 for all routes         1					4444			
Manual Manual Manual Manual Manual Manual 8,528 2,528 2,73% 73% 73% 73% 73% 73% 73% 70% 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5 2,5		Private	Private	Public	Private	Private		Private
4,881 8,526 2 1 1 1 73% none n/a 4 2 9 845 2,Feb 1	-	Manual	Macina	Semi-	Semi-	eļu		e/u
2 1 1 1 73% 73% 73% 73% none n/a n/a 1/a 2 9 845 2 9 9 ck 2 2 2 Feb 1 3 for all roules	-	8,526	3.500	3,300	11,328	2,800	1,422	n/a
73% 73% 73%  none	-	-	-	-	Weekly		-	-
A 2 P 9 A 2 9 O O O O O O O O O O O O O O O O O O		73%	47%	10%	65%	54%		76%
4 2 9 845 9035 ck 2 2+eb 1		n/a		n/a				n/a
6k 2 2-Feb 1 3 for all roules.	2	6	1	5	8	n/a	1	n/a
3 for all roules.		9,035	009	110	801	n/a		e/u
	Z-Feb	<b>—</b>	<u> </u>	2	2	n/a	3	n/a
all collection	les.							<b>January</b>
Number of route foremen 1 1	-	-		-	-	n/a		n/a
5		6	-	9	8	n/a		n/a
Number of total crew (FTEs) 8 2			2	12	13	n/a	2	n/a

			Frederick	City of		Arlington			
	Rockville	College Park	County	Fairfax	Ocean City	County	Gaithershurg	Takoma Park	Fairfax County
Yard Wasta Collection									
									Public/
Public/Private	Public			Public	Public	Public	Private		Privale
					Semi-				Serni-
Collection Type	Manuai	Manual		Manual	Automated	Manuat	n/a		Automated
Annual tons collected	2,320			3,500	9	260	10,000	604	14,715
Fraquency (per week)	-			+	Once per year	April			1 (seasonal)
Sel-out rate or participation rate	e/u								
Set-out limits	auou				n/a		n/a		
Number of routes per day	2	2		1	n/a	10	n/a	1	16
Avg. Number of households per route	3,380			600	u/a	641	n/a		500
Number of crew members on each truck	2			3	n/a	2	n/a	3	3
	3 for all routes,								
	all collection								
Number of route foremen	types	1			n/a	-	n/a		3
Number of crew with CDL	4				n/a	3	n/a		1
Number of total crew (FTEs)	Þ			9	n/a	9	n/a		92
Bulky Collection									
Public/Private	ojiqnd		Private	Public	Public	Public	Public		Pub/Pri
		Manual/Semi-					Semi-		Semi-
Collection Type	Manual	Auto	Manuai	Automated	Manual	Automated	Automated		Automaled
					. !	Metal-562			
Annual tons collected	5		978	800	381	Brush-5,553	1,200		4,694
Frequency (per week)	call in	2	txlyr	-	3	Bi-weekly	1x/month	Schednled	Call in only
Sef-out rate or participation rate	n/a								
Set-out limits	none	Shingles			n/a				
Number of routes per day	l,	9	10	1	Varies	10	1		nta
Avg. Number of households per route	e/u		8	009	Varies	641	2,500		170
Number of crew members on each truck	2		2	2	1	1	2		2
	3 for all routes,								
	all collection				,				
Number of route foremen	types		-		<b>.</b>	•-	-		-
Number of crew with CDL	2		1	1	1	3	all.		1
Number of total crew (FTEs)	2			2	2	3	9		18

				Frederick	City of		Artington			
_		Rockville	College Park	County	Fairfax	Ocean City	County	Gaithersburg	Takoma Park	Fairfax County
E	Number of trucks									
Ac	Active	15	7	6	7	29	9	3	9	31
ŝ	Spare	7	2	3	2	0 ]	2	0	2	21
Task Pay	Pay	Yes	, se k	No	N <sub>o</sub>	No	e/u	n/a	Yes	Yes
Unionized	lized	Yes	Yes	ŝ	2	No	n/a	Š	Yes	ž
Work	Workday ( hours)	10	8	8	8	8	89	8	8	8
Resid	Residential Rates									
		1 rate for all								
Ö	Garbage	combined								\$5.00
_		1 rate for all								
ř	Recycling	combined						\$51.90		
		1 rate for all								
<del>بر</del>	Yard Waste	combined								\$4.00
		1 rate for all				·				
Bulk	XIC	combined								\$55/ton
	Total	\$27.75								
Curre	Current Disposal Fee (\$fton)	\$52.00	\$0.00	\$50.00	\$43.50	\$45.00	\$64.03	set by county	\$48.00	
Comu	Commercial/Multi-Family Dumpater Collection									
Ŏ	Collection Provider									
+	CityCollab	eju			n/a	×			×	
1	Come as Desidonfiel	S S	<u>&gt;</u>							
1	Same as Aesidennal	27-	,				,	ļ	,	
-	Upen	n/a					Y	Ý	Ý	
Resid	Residential Refuse Collection									
ŭ	Collection Location									
	Curbsida	×	×			×	×	×	×	
	Back/Side door	×	×		×		×			
É	if combination, does rate structure vary?	No	ON					n/a		
Resid	Residential Recycling Collection									
ŭ	Collected									
	Curbsort	×							×	
	Curbside Commingled	×	×		×	×	×	×		
	Drop-off Centers					x	×	x]		
	None									
Ž	Materials Collected									
	Newspaper	×	×		×	×	×	×	×	
	220	×			×	×	×	×		
	Magazines	×	×		×	×	×	×	×	
	Mixed Paper	×	×		×	×	×	×	×	
	Polycoated/aseptic		×							
	Glass	×			×	×	×	×	×	
	Plastic	×	×		×	×	×	×	×	
	Aluminum	×	×		×	×	×	×		
	Steet				×		×	x[		
					•		Batteries			
_	Other						ram waste			]

Γ				Fraderick	City of		Arlington			
		Rockville	College Park	County	Fairfax	Ocean City	County	Gaithersburg	Takoma Park	Fairfax County
2	Residential Yard Wasta/Leaf Collection									
Γ	Collected									
	Rear loader	×	×		×	×	×	×	×	
	Boam Iruck				×		×	X		
	Other				Vacuum	Automated				
	Set out									
	Garbage cans	×			×	×	×			
Ī	Biodegradable Paper Bags	×			×		×	×	×	
Γ	Plastic Bags				×	×				
Γ	Tied in Bundles	×	×		×	×	×	×		
Г	Loose/Piles	×	×				×	×		
	Other									
	Offered only during peak season									
	No	×	×		×			×	×	
	Yes					April	Year-round			
	Residential Leaves Collection									
Г	Mixed with Yard Waste	×	×			×		×		
Γ	Seperated from Yard Waste				×			×	×	
=	if leaf collection is separate from Yard Waste Collection									
Г	Collected									
	Leaf Vacuum	×	×		×		×	×	×	
Г	Rear loader	×					×	×		
	Boom truck									
	Other									
	Set-out				×					
	Garbage Cans				×	×				
	Biodegradable Paper Bags				×		×	×		
	Plastic Bags					×				
	Loose/Piles	×	×				×	×	×	
П	Other									
							Nov & Dec,	Bags-all year, vacuum-few		
	Announting to months	Oct - Dog April	S you		10/15,1/1	d iz	bags until mid-	weeks each	CoO	
٦	Approximate morning	מייי ביייי	200 0 200		11-01-01	2		apling and ion.	201-101	

# City of Rockville Local Community Benchmarking Survey

Г				Frederick	City of		Arlington			
		Rockville	College Park	County	Fairfax	Ocean City	County	Gaithersburg	Takoma Park	Takoma Park   Fairfax County
18	Residential Bulk Collection									
	Materials Accepted									
Γ	Furniture/mattresses	×	×	×	×	×	×	×	×	×
T	Appliances/White Goods	×	×	×	×	×	×	×	×	×
Γ	C&D Debris	×	×		×		×			
Γ	Wood	×	×		×		×	×	×	×
T	Boxes/Boxed wood	×	×		×	×	×	×		
	Bulky scrap metal	×	×		×		×	×		×
	Househols Clean-outs/move-outs	×	×		×	×	×	×		×
	is bulk collection schedule or unscheduled	Unscheduled	Unscheduled	Scheduled		Scheduled	Scheduled	Scheduled	Scheduled	Scheduled
	Are there set-out limits									
	No	×	×	×		×	×			
		,								Normal
					1 tandem dump					pionesnou
	Yes			Will be soon	truck load			4x4x8 pile	×	waste only
<u> </u>	Additional charge (yes/no)	No	No	No (currently)	No	Yes	Yes	No	Yes	No
100	Personnei-Resisted issues									
	Overcome unscheduled absenteeism by:									
	Hire temporary labor	×	×		×				×	×
	Require loner work days							×		×
	Shift craws from other solid waste department		×			×				
П	Sift staff from other departments to perform collection							×	×	×
					malgord					·=·=·=
	Other				minimal					
	Total number of injuries attributable to solid waste collection	24	17		9	7			10	40
	Total number of lost days attributable to injuries	486	7.8		6	4			45	102
	Total number of restricted days attributable to injuries	118	127		12	0			0	730
	Claim dollars associated with injuries	\$110,528			\$13,964	n/a				
	If city uses automated or semi-automated collection vehicles:	n/a	Į							
	Number of injuries	n/a	No change			Decresed 25%				No change
	Lost days attributable to injury	[ n/a	No change			Decresed 10%				No change
	Resticted days attributable to injury	n/a	No change			No change				No change
	Claim dollars associated with injuries	] n/a	No change			No change				No change

# Appendix B ROUTE OBSERVATION SUMMARY



# Appendix B ROUTE OBSERVATION SUMMARY

R. W. Beck performed a series of field observations designed to measure current route productivity, identify local characteristics that impact efficiency, and evaluate any obstacles that the City may face in upgrading its collection system. A detailed PowerPoint presentation was given to City staff to summarize the results of our route observation—this presentation is attached as an additional reference. This section describes the current solid waste and recycling collection system for the City of Rockville, as well as notable observations we made.

#### **Customer Classes**

The City of Rockville provides refuse, recycling, yard waste, bulky waste, and special item collection to all single family residences and townhomes in the City. Rockville also provides City Park and City Building collection. The City does not provide commercial dumpster or roll-off collection, which are left to the private sector.

While most of the services provided by the City involve collecting material from the easement or right-of-way in a curb or alley, Rockville provides backdoor refuse collection to any resident who requests it. Table 1 provides the breakdown of service locations for refuse collection from residential customers.

Table 1
Residential Refuse Service Location Summary

Location of service	Housing Units
Curbside	7,187
Backdoor	5,132
Alley	1,287
Total	13,606

The City provides solid waste and recycling collection to all residential units within City limits. The current collection system is based on a four day work week with the routes designed for a ten (10) hour workday. The collection system is described below.

#### Refuse Collection

City residents currently receive twice per week unlimited refuse collection service via rear-loading compactor collection vehicles. Roughly 47 percent of all customers are estimated to set out at the backdoor, with the remaining setting out at the curb. City crews collect any bulky material placed at the curb. Crews carry 90 gallon carry barrels to collect refuse from behind houses. Figure 1 shows an example of a curbside/backdoor refuse crew working in a cul-de-sac. Figure 2 shows the two-person crew and rearload collection vehicle used by the City for alley collection.



Figure 2.1 Curbside Refuse Collection

Figure 2.2 Alley Refuse Collection

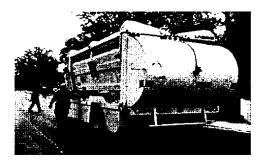
We make the following observations of Rockville's refuse collection system:

- Rockville is in a small minority of communities that provides backdoor collection for the same standard rate as curbside collection. Most other cities that allow backdoor collection offer it only as a premium service with a higher rate.
- Collection productivity is reasonable given the backdoor collection requirement. As expected, the first weekly collection day takes longer to complete and collects more waste than the second weekly collection day. The current system should be adequate to handle incremental growth in the customer base in the near term.
- Collection vehicles appear to be well maintained and are appropriately spec'ed for the system.
- The City's current definition of a "task" is generally appropriate given the requirement for backdoor collection. However, there is potential to increase the length of time for a daily task if the City considers converting to curbside collection or implements semi-automated or fully automated collection.
- The sections of the City requiring alley collection are serviced at a faster rate than the remaining areas. No changes to the alley collection system are needed at this time.
- The City accepts many materials in the refuse collection system that are over and above the typical municipal collection system. Specifically, the City will collect a range of construction, demolition (tear-down and tear-out) and renovation debris from residential units. Materials collected include cinder blocks, dimensional lumber, doors, fences, concrete, brick, carpet, and other large items.

■ Because of safety concerns, equipment operators are not allowed to ride on the safety step to the side and rear of the collection vehicle. We concur that this decreases the risk of major injury, although it also reduces collection productivity by requiring additional walking for collectors (who must either walk from stop to stop, or walk back up to climb in the cab to drive between stops). Most public and private collection system operators allow collectors to use this step, which is approved by OSHA.

#### **Recyclables Collection**

The City provides weekly dual stream collection of recyclable materials via manual 2person crew, two-compartment recycling trucks. Figure 3 shows a recycling collection in progress. Figure 4 shows a typical recycling set-out in a City blue bin.



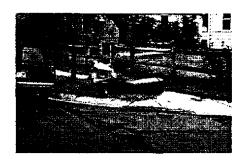


Figure 2.3 Recycling Collection Vehicle

Figure 2.4 Recycling Collection Set-out

We make the following observations about the recycling collection system:

- The set-out rate in Rockville was measured at 61 percent. This is at the high end of the range we typically observe, and suggests that Rockville residents are relatively active in participating in recycling.
- Collection productivity was within the expected range and appears satisfactory. However, the current system should be able to handle incremental growth without adding additional routes in the near future.
- Collection vehicles are well maintained and are appropriately spec'ed for the system.

#### Yard Waste and Leaf Collection

City residents receive weekly contained yard waste collection via the same rearloading vehicles that are used for refuse. This collection is limited to bags and containers that can easily fit into the hopper of the rear-load vehicles. Figure 5 shows yard waste collection in progress, and Figure 6 shows the type of yard waste set-out that would be picked up in this type of collection vehicle.



Figure 2.5 Yard Waste Collection Vehicle

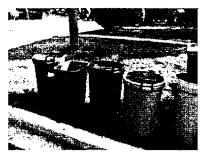


Figure 2.6 Yard Waste Collection Chipper Truck

The City also collects larger, loose piles of yard waste, typically brush and limbs, using a chipper truck with a two-person crew. The chipper truck consists of a closed bodied dump bed truck with a chipper towed behind. Figure 7 shows the chipper truck in progress of performing a collection, and Figure 8 shows a loose yard waste set-out.



Figure 2.7 Chipper Truck



Figure 2.8 Loose Yard Waste Set-out

We make the following observations about the City's yard waste collection system:

- Yard waste collection productivity is within expected, satisfactory ranges compared to other collection systems. Yard waste routes pass by over 3,300 households per day.
- The City runs an additional rearloader during the peak yard waste season to handle higher generated quantities. This is a common practice among municipal service providers.
- Grass and leaves collected in the rearloaders are delivered to the Montgomery County transfer station, where a tip fee of \$29/ton is paid. Chipped brush is delivered to an alterative site that does not charge a tip fee.
- The rearloader and the chipper truck run identical routes, often leapfrogging each other to collect piles. Our analysis shows the rearloader has the capacity to handle all yard waste set-outs. The cost savings associated with eliminating the chipper route is greater than the added expense of delivering brush to the transfer station.

Although we did not have an opportunity to observe it, the City provides seasonal leaf collection in both the Spring and Fall using a vacuum truck. This is a commonly provided service in municipalities that experience heavy leaf fall.

#### Other Collection Services

Rockville accepts a range of materials requiring special collection and handling. The City also provides separate collection of the following:

- White goods and metal (call-in);
- Motor oil (weekly);
- Car batteries & tires (weekly);
- Hazardous waste including oil-based paint, flammable liquids, pesticides and poisons, acids and caustics, and pool chemicals (monthly).

These special collection services represent a premium service level to the City's residents, and promote and preserve environmentally responsible solid waste management practices.

#### City Parks/City Building Collection

The City Parks are collected five days per week with crews scheduled to work eight (8) hours per day. Most parks receive litter basket collection via a rear-loader collection vehicle manned by a two person crew on a daily basis. Crews empty the litter baskets scattered throughout the parks using a 90 gallon carry barrel. Litter baskets are dumped into the carry barrel until it is full and then carried back to the rearload truck on the crew person's back. An example of a litter basket collection is shown in Figure 9.

Street baskets are collected throughout the governmental section of Rockville. Crews use carry barrels to collect the street baskets that are located in the area that does not allow for vehicle traffic.

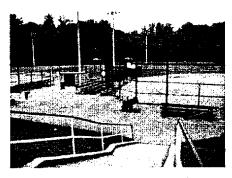


Figure 2.9 Parks Collection



Figure 2.10 City Building Recycling Collection

After the crew completes the parks and litter basket collection, the rearload truck is emptied at he Montgomery County transfer Station. The empty truck is driven back to the vehicle yard, where it is washed out in preparation for recyclable material collection. The crew uses the same truck to begin collecting recyclables from City buildings. Crews place mixed office paper in the hopper of the truck and place mixed beverage containers in large plastic bags. These large plastic bags containing the mixed beverage containers are carried from building to building in the empty hopper of the rearload truck. At every stop the bags have to be unloaded while the mixed paper is collected and packed and then loaded back into the hopper. An example of this process is shown in Figure 10, 11, and 12.





Figure 2.14 City Building Recycling Collection

Figure 2.15 City Building Recycling Set-out

We make the following observations about the City Parks and City Building collections:

- City Park and street basket collection services contribute to the aesthetics and cleanliness of the City, and are commonly provided by other municipal service providers;
- City building recycling collection demonstrates a commitment to recycling within Rockville. This commitment was also apparent in the residential recycling system.
- Rather than wash out the rearloader for use in collecting recyclables from City buildings, the City may wish to consider having this crew swap out the rearloader for a spare dual compartment recycling truck for performing City building recycling collection. This could decrease time spent in the yard, and also simplify the loading of two streams of recyclables into a multi-compartment truck.

#### Other Observations

We made the following additional observations as part of our analysis:

■ Pre- and post-trip inspections were not performed consistently. This is a common problem among municipal collection systems, and represents an area where frequent education of the collection crews is required.

#### **Route Observation Summary**

- The vehicle fleet is well maintained and size appropriately. The overall spare ratio is 25 percent, which is in line with industry standards. Table 2 below summarizes the active and spare vehicles needed for solid waste collection.
- We were informed during route observations that the City's fleet maintenance division is charged with maintaining refuse collection vehicle over a 15 year useful life. This is the longest useful life target we have found in any collection system, public or private, across the country. The typical lifespan of a rearload vehicle ranges from seven to ten years depending on annual hours of operation. Automated vehicles typically last no more than seven or eight years. recommend that the City closely monitor the annual maintenance and repair costs as vehicles extend beyond their industry standard useful life, as it may make more economic sense to replace vehicles sooner than the 15 year lifespan.

Table 2 **Active and Spare Vehicles** 

	Number of Trucks			Spare
Vehicle	Active	Spare	Total	Ratio
Rearloader	12	5	17	29%
Recycling Truck	4	1	5	20%
Chipper Truck	1	0	1	0%
Flat Bed Truck	1	0	1	0%
Total	18	6	24	25%

# Appendix C FOCUS GROUP SUMMARY



# Appendix C FOCUS GROUP SUMMARY

#### Overview

Focus group meetings have proven to improve participation in the project among front-line staff and help management in obtaining buy-in for project recommendations. As part of the field observations conducted for the City of Rockville, R. W. Beck facilitated two separate Focus Groups with randomly selected operational personnel from the City's solid waste collection employees. The groups were attended by the following representatives:

- Refuse Collection Equipment Operators
  - Curbside and Backdoor
  - Alley
- Recycling Collection Equipment Operators;
- Bulk/Special Waste Collection Equipment Operators; and
- Parks and City Building Collection Equipment Operators.

The purpose of the focus groups was to identify the current successes of the City's collection system, problems that require attention, and potential solutions to these problems that would improve the current collection system.

The complete set of Focus Group Notes can be found attached in the form of PowerPoint slides.

#### Successes

It is the nature of focus group meetings that most of the information offered relates to problems and complaints. However, the focus group sessions initially focus on identifying the positive attributes of the system.

To this end, both groups cited the following as things that are currently working well:

- 4-day work week (10-hour days); and
- Task pay (getting paid for 10 hours, regardless of hours worked).

Other notable successes include good preventative maintenance program, starting early (at daybreak), and appreciation of the fact that supervisors came up through the ranks.



#### **Problems and Solutions**

Most of the time spent in focus groups is spent obtaining input about problems.

Several problem areas were identified by the groups (as expected in this type of exercise). The primary areas of concern were as follows:

- Backdoor collection;
- Have not added routes or trucks to meet growth;
- Not allowed to ride on the back of trucks;
- Poor communication between management and collection crews;
- Slow repair process on collection vehicles;
- No support from senior management/elected officials; and
- City does not enforce set-out limits.

The main intent of the meeting was to ask participants to offer their own solutions to the problems identified. Table 1 summarizes the three actions that were rated by the focus group participants as having the most potential for positive impact on improving their jobs.

Summary of	Table 1 Focus Group Prioritized Solutions	
Highest Rated Solution	Eliminate backdoor collection	
Second Rated Solution	Add routes/trucks/crews to meet growth	
Third Rated Solution	hird Rated Solution  Allow crews to ride on the special step on the side of the hopper towards the rear of the truck	

It is noteworthy that collection crews are strongly supporting of eliminating backdoor collection. R. W. Beck's field observations support the operational benefits of eliminating backdoor collection service. This solution would also directly address the second rated solution. By eliminating backdoor collection, current collection crews would experience increased productivity and would not need additional trucks or crews.

The third-rated solution was notable because most other collection systems do allow collection crew members to ride on the specially designed, safety-approved steps located on the side and to the rear of the truck. This would further increase collection productivity in two ways. First, collectors could step up onto the vehicle to drive to the next set-out more quickly than if they have to walk back up to the cab. Second, by allowing the use of this rear step, collectors will likely decrease the amount of walking needed to collect from the route.

These considerations notwithstanding, Rockville has expressed a commitment to safety in all collection operations, and we concur that prohibiting the use of this rear step will eliminate a range of injuries that can be sustained from unsafe use of the step.

2 R. W. Beck 9/9/04

# Solid Waste Collection Efficiency Study Focus Group Notes City of Rockville June 10 & 11, 2004



# **Background**

## **Focus Group Summary**

- Facilitated Focus Groups conducted with randomly selected operational personnel
  - Refuse Collection equipment operators
    - Curbside & backdoor
    - Alley

- Recycling Collection equipment operators
- Bulky/Special Waste Collection equipment operators
- Parks & City Building Collection equipment operators
- Two separate Focus Groups conducted to assure broad participation from representative crews

## **Focus Group Procedures**

- Objective: Capture valuable input from the people doing the job
- Structured facilitation

- What is working well now? (10 minutes)
- What isn't working? (30 minutes)
- What are the solutions? (20 minutes)
- Prioritization of findings

# Results (Focus Group 1 and Focus Group 2)

- Introduction
- Objectives
- **6** Ground Rules
- Brainstorm

## What Works Now? (Focus Group 1)

- 4-day work week (10-hour day)
- PM program good
- Task pay (10 hours no matter what)
- Appreciates new management (only 3 weeks)
- Route supervisor
- Starting early at daybreak
- Supervisors came up through ranks
- PM program

### What Does not Work? (Focus Group 1)

- Have to work at night in winter but can not start before daylight
- Have not added routes or trucks to meet growth
- 2 man crews should be 3 man crews
- Must take bulk items
- High turnover no training hard work
- Not supported by City Hall
- Route supervisors not listened to
- Customers spoiled

- Recycling gets less respect than trash
- Different pay, same work level
- Supervisors don't do entire job crews have to
- Repairs not timely
- PM scheduling
- Backdoor collection
- Double days, no extra pay
- Dog waste in parks
- Can not ride on back of truck

# **Solutions (Focus Group 1)**

- Eliminate backdoor [10 votes]
- Allow riding on back of truck [8 votes]
- Size and rebalance routes. More trucks[7 votes]
- Open (improve) communication

- Listen to crews (Senior Mgmt.) [7 votes]
- 3 man crew (driver and 2 labor) [5 votes]
- Replace recycling bins [5 votes]
- Supervisors help on small call-backs[3 votes]
- Eliminate special pick up [1 vote] or charge for it [3 votes]
- More training for city customer service [1 vote]
- Enforce/support City set-out policy
- Dedicated refuse mechanic crew

# What Works Now? (Focus Group 2)

- 4-day week
- Task pay
- Benefits

- Good crews
- Job security w/backdoor service

## What does not Work? (Focus Group 2)

- Not using trucks as designed
- City does not limit set-outs
  - Contractors abuse system
- City does not enforce set-out limits
- Not supported by senior management/elected officials
- Backdoor service

- Workloads are getting larger and no additional help
- Management does not listen to suggestions from crew about truck specs
- Slow repair process on vehicles
- No air conditioner or fans

## **Solutions (Focus Group 2)**

- Add routes/trucks/crew [10 votes]
- Eliminate backdoor service [9 votes]
- Enforce set-out limits [6 votes]
- Larger capacity trucks for recycling[6 votes]
- Allow crews to ride on back of trucks[6 votes]
- Marked yard waste containers [4 votes]
  - Or, change day of collection [1 vote]
- Re-balance routes [3 votes]

- Consistent weather policy [3 votes]
- Safety incentives [3 votes]
- Re-train supervisors [3 votes]
  - Sanitation management training [2 votes]
  - On job training in field/route [1 vote]

# Combined Solutions (Both Focus Groups)

- 19 votes: Eliminate backdoor collection
- 17 votes: Add routes/trucks/crew

- 14 votes: Allow riding on back of truck
- 7 votes: Open/improve communication
- No other solutions got more than 6 votes